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**Testing the spatial distribution of plant diseases through permutation and randomization methods**

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**TESTING THE SPATIAL DISTRIBUTION OF PLANT DISEASES THROUGH PERMUTATION AND RANDOMIZATION METHODS.** **G. Lione, L. Giordano, P. Gonthier.** *Department of Agricultural, Forest and Food Sciences (DISAFA), University of Torino, Largo Paolo Braccini 2, I-10095 Grugliasco (TO), Italy.*
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The analysis of the spatial distribution of plant diseases is a pivotal issue in plant pathology. A series of geostatistical tests based on permutation and randomization is proposed to assess the spatial distribution of plant diseases when the variable of phytopathological relevance is categorical. Monte Carlo simulations run to provide estimates of power and type I error showed the good performances and the reliability of the tests (power > 0.80; type I error < 0.05). The tests were successfully validated by verifying the consistency between their output and previously published results on the spatial distribution of spores of two fungal pathogens causing root rot on conifers, i.e. *Heterobasidion annosum* and *H. irregulare*. The tests were also carried out to analyze the influence of plantation density on the distribution of sweet chestnuts infected by *Gnomoniopsis castanea*, an emerging fungal pathogen causing nut rot. Trees carrying nuts infected by *G. castanea* were randomly distributed in patches with different plantation densities, suggesting that the distribution of the pathogen was unrelated to the plantation density. These geostatistical tests could be applied in the analysis of the spatial distribution of plant diseases both in agriculture and in forestry. A user-friendly software embedding the algorithms that perform the tests is also available.